

Work Order ID 135091

135091

Page 1

July 29, 2015 7:44:23 AM

Item ID: D412-664-209 Accept ***N900040100*** Setup Start ***NS1***
 Revision ID: Stop ***NS2***
 Item Name: Aft Crosstube - Low Standard
 Start Date: 7/29/2015 Start Qty: 1.00 ***1*** Cust Item ID:
 Required Date: 8/12/2015 Req'd Qty: 1.00 ***1*** Customer:
 Reference:

Approvals: Process Plan: SH Date: 20150729 Tooling: _____ Date: _____ Run Start ***NR1***
 QC: _____ Date: _____ SPC (Y/N): _____ Date: _____ Stop ***NR2***

Sequence ID/ Work Center ID	Operation Description	Set Up/ Run Hours	Tool ID	Tool #	Plan Code	Accept Qty	Reject Qty	Reject Number	Insp. Stamp
Draw Nbr	Revision Nbr								
D412-664-249	C								
100	Document Control	0.00							
100	DOCUMENT CONTROL								DAS 02 9-89
DC	Memo	0.00							
Doc.Control -USB or Paperwork	Photocopy bluefile and create labels as per PPP D412-664-209	CHG005							AUG 10 2015
110	Packaging	0.00							
110									
Packaging	Memo	0.00							
Packaging									
120	BENDING MACHINE - CROSSTUBES	0.00							
120									
CNC Bend 2	Memo	0.00							
CNC Alpha 160 Bender	Bend tube as per Dwg D412-664-249 using CNC bender program	and Folio FT							

MLJ 15-08-10

TW 15-07-29

TW 15-08-04

DQA: _____ Date: _____



WORK ORDER NON-CONFORMANCE / UPDATE

QA Closed: _____ Date: _____

Work Order update only ☐

Work Order: _____ Part No. _____ NCR No. _____	DISPOSITION Rework ☐ Scrap ☐ Use-as-is ☐ Suspected Unapproved ☐	AGAINST DEPARTMENT/PROCESS Skid-tube ☐ Machining ☐ Thermoforming ☐ Large Fab ☐ Cross tube ☐ Small Fab ☐ Finishing ☐ Composite ☐ Water Jet ☐ Prod. Eng. Coord. ☐ Rec/Store/Packaging ☐ Supplier ☐ Engineering ☐ Quality ☐ Other ☐			
Date :	Step #:	QTY Effective :		MRB (QS1042) Approval	
Description Work Order Deviation		Disposition		Completed By	
				Lead hand / Supervisor Approval Verification	
				QC / QA Coordinator Approval	
Root Cause Environment ☐ Design ☐ Doc/Data ☐ Equip/Tooling ☐ Handling/Pre ☐ Material ☐ Internal Transport ☐ Tribal Knowledge ☐ LOA ☐ Substation ☐ Past Expiry Date ☐ Misidentified ☐ No Re-verification ☐ Operator ☐ Offset/Setup ☐ Supplier ☐ Training ☐ Use for Testing ☐ Poor Information ☐ Rushing ☐ Product Improvement ☐ Process Improvement ☐ Manufacturing Process ☐ Past Due ☐		FAULT CATEGORY Pressure/Forced ☐ Bending ☐ Centre Not Concentric ☐ Cracks ☐ Crimp/Kink/Ripple/Wave ☐ Cuffs ☐ Crushing ☐ Heat Treat ☐ Wave/Twist in Tube ☐ Marks/Chatter ☐ Temperature/Cure ☐ Set-up ☐ BOM/Route ☐ Broken/Damage/Defect ☐ Inspection Incomplete/Unqualified ☐ Contamination ☐ Countersink ☐ Cut Too Short ☐ Instructions Incomplete/Unclear ☐ Drill Holes ☐ Power Loss/Surge ☐ Folio/Program ☐ Grain ☐ Weld ☐ Wrong Stock Pulled ☐ Out of Sequence ☐ Off-set ☐ Misabeled ☐ Fit/Function ☐ Misaligned/off center ☐ Positioned Wrong ☐ Outside Dimensions ☐ Over/Under tolerance ☐ Part Incorrect ☐ Part Lost/Missing ☐ Part Moved ☐ Drawing ☐ Finish ☐ Misread ☐ Turning Sequence ☐			
OTHER : _____					

Work Order ID 135091

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July 29, 2015 7:44:24 AM

Item ID: D412-664-209

Accept

N900040100

Setup Start ***NS1***

Revision ID:

Item Name: Aft Crosstube - Low Standard

Stop ***NS2***

Start Date: 7/29/2015 Start Qty: 1.00

1

Cust Item ID:

Required Date: 8/12/2015 Req'd Qty: 1.00

1

Customer:

Reference:

Approvals: Process Plan: _____ Date: _____ Tooling: _____ Date: _____
QC: _____ Date: _____ SPC (Y/N): _____ Date: _____

Run Start ***NR1***
Stop ***NR2***

Sequence ID/ Work Center ID	Operation Description	Set Up/ Run Hours	Tool ID	Tool #	Plan Code	Accept Qty	Reject Qty	Reject Number	Insp. Stamp
130	QC15- Crosstube Dimensional Check	0.00							DMS 38 9-89
130									
QC	Memo	0.00							
Quality Control									15-08-04
140	Crosstubes	0.00							
140									
Crosstubes	Memo	0.00							
Crosstubes	***** ENSURE PROPER JIG POSITIONING *****								
	1-Drill Rivet holes as per Dwg D412-664-249 .								
	2-Drill pilot holes in tube as per Dwg D412-664-249								
	3-Ream hole to finish size in tube as per Dwg D412-664-249								
	4.*** WEAR LATEX GLOVES WHEN HANDLING CROSSTUBE***								
	Deburr & Inspect for surface damage. Repair damage within limits as per Dwg D412-664-249								

BL

15/08/04

DQA: _____ Date: _____



WORK ORDER NON-CONFORMANCE / UPDATE

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Work Order update only ☐

Work Order: _____ Part No. _____ NCR No. _____		DISPOSITION Rework ☐ Scrap ☐ Use-as-is ☐ Suspected Unapproved ☐		AGAINST DEPARTMENT/PROCESS <table style="width: 100%; border: none;"> <tr> <td style="width: 16.6%;">Skid-tube ☐</td> <td style="width: 16.6%;">Cross tube ☐</td> <td style="width: 16.6%;">Water Jet ☐</td> <td style="width: 16.6%;">Engineering ☐</td> </tr> <tr> <td>Machining ☐</td> <td>Small Fab ☐</td> <td>Prod. Eng. Coord. ☐</td> <td>Quality ☐</td> </tr> <tr> <td>Thermoforming ☐</td> <td>Finishing ☐</td> <td>Rec/Store/Packaging ☐</td> <td>Other ☐</td> </tr> <tr> <td>Large Fab ☐</td> <td>Composite ☐</td> <td>Supplier ☐</td> <td></td> </tr> </table>						Skid-tube ☐	Cross tube ☐	Water Jet ☐	Engineering ☐	Machining ☐	Small Fab ☐	Prod. Eng. Coord. ☐	Quality ☐	Thermoforming ☐	Finishing ☐	Rec/Store/Packaging ☐	Other ☐	Large Fab ☐	Composite ☐	Supplier ☐	
Skid-tube ☐	Cross tube ☐	Water Jet ☐	Engineering ☐																						
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Thermoforming ☐	Finishing ☐	Rec/Store/Packaging ☐	Other ☐																						
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								Lead hand / Supervisor Approval Verification																	
								QC / QA Coordinator Approval																	
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Environment ☐	No Re-verification ☐	Pressure/Forced ☐	Temperature/Cure ☐	Power Loss/Surge ☐	Positioned Wrong ☐																				
Design ☐	Operator ☐	Bending ☐	Set-up ☐	Folio/Program ☐	Outside Dimensions ☐																				
Doc/Data ☐	Offset/Setup ☐	Centre Not Concentric ☐	BOM/Route ☐	Grain ☐	Over/Under tolerance ☐																				
Equip/Tooling ☐	Supplier ☐	Cracks ☐	Broken/Damage/Defect ☐	Weld ☐	Part Incorrect ☐																				
Handling/Pre ☐	Training ☐	Crimp/Kink/Ripple/Wave ☐	Inspection Incomplete/Unqualified ☐	Wrong Stock Pulled ☐	Part Lost/Missing ☐																				
Material ☐	Use for Testing ☐	Cuffs ☐	Contamination ☐	Out of Sequence ☐	Part Moved ☐																				
Internal Transport ☐	Poor Information ☐	Crushing ☐	Countersink ☐	Off-set ☐	Drawing ☐																				
Tribal Knowledge ☐	Rushing ☐	Heat Treat ☐	Cut Too Short ☐	Mislabeled ☐	Finish ☐																				
LOA ☐	Product Improvement ☐	Wave/Twist in Tube ☐	Instructions Incomplete/Unclear ☐	Fit/Function ☐	Misread ☐																				
Substation ☐	Process Improvement ☐	Marks/Chatter ☐	Drill Holes ☐	Misaligned/off center ☐	Turning Sequence ☐																				
Past Expiry Date ☐	Manufacturing Process ☐	OTHER : _____																							
Misidentified ☐	Past Due ☐																								

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Item ID: D412-664-209

Accept

N900040100

Setup Start

NS1

Revision ID:

Stop

NS2

Item Name: Aft Crosstube - Low Standard

Start Date: 7/29/2015 Start Qty: 1.00

1

Cust Item ID:

Required Date: 8/12/2015 Req'd Qty: 1.00

1

Customer:

Reference:

Approvals:

Process Plan: _____

Date: _____

Tooling: _____

Date: _____

Run Start

NR1

QC: _____

Date: _____

SPC (Y/N): _____

Date: _____

Stop

NR2

Sequence ID/ Work Center ID	Operation Description	Set Up/ Run Hours	Tool ID	Tool #	Plan Code	Accept Qty	Reject Qty	Reject Number	Insp. Stamp
150	QC5- Inspect part completeness to step on W/O	0.00							DAS 49 9-89 150804
150									
QC	Memo	0.00							
Quality Control	*** WEAR LATEX GLOVES WHEN HANDLING CROSSTUBE***								
160		0.00							DAS 41 9-89 15-8-5
160									
HandFXtube	Memo	0.00							
Hand Finishing Crosstubes	*** WEAR LATEX GLOVES WHEN HANDLING CROSSTUBE***								
	1- CLEAN CROSSTUBE WITH WASH'N WIPE								
180	Outsource process - NDT per QSI038 4.1	0.00							
180									
Outsource2	Memo	0.00							
Outsource process - NDT	*** WEAR LATEX GLOVES WHEN HANDLING CROSSTUBE***								
	Liquid Penetrant Inspection as per QSI 038 Issue P/O: 29379 LPI as per ASTM 1417 Level 2 Attach copy of NDT results to work order								

CZ

AUG 05 2015

DQA: _____ Date: _____



WORK ORDER NON-CONFORMANCE / UPDATE

QA Closed: _____ Date: _____

Work Order update only ☐

Work Order: _____ Part No. _____ NCR No. _____		DISPOSITION Rework ☐ Scrap ☐ Use-as-is ☐ Suspected Unapproved ☐		AGAINST DEPARTMENT/PROCESS Skid-tube ☐ Machining ☐ Thermoforming ☐ Large Fab ☐ Cross tube ☐ Small Fab ☐ Finishing ☐ Composite ☐ Water Jet ☐ Prod. Eng. Coord. ☐ Rec/Store/Packaging ☐ Supplier ☐ Engineering ☐ Quality ☐ Other ☐					
Date :		Step #:		QTY Effective :			MRB (QSI042) Approval		
Description Work Order Deviation				Disposition				Completed By	
								Lead hand / Supervisor Approval Verification	
Root Cause		FAULT CATEGORY							
Environment ☐	No Re-verification ☐	Pressure/Forced ☐	Temperature/Cure ☐	Power Loss/Surge ☐	Positioned Wrong ☐				
Design ☐	Operator ☐	Bending ☐	Set-up ☐	Folio/Program ☐	Outside Dimensions ☐				
Doc/Data ☐	Offset/Setup ☐	Centre Not Concentric ☐	BOM/Route ☐	Grain ☐	Over/Under tolerance ☐				
Equip/Tooling ☐	Supplier ☐	Cracks ☐	Broken/Damage/Defect ☐	Weld ☐	Part Incorrect ☐				
Handling/Pre ☐	Training ☐	Crimp/Kink/Ripple/Wave ☐	Inspection Incomplete/Unqualified ☐	Wrong Stock Pulled ☐	Part Lost/Missing ☐				
Material ☐	Use for Testing ☐	Cuffs ☐	Contamination ☐	Out of Sequence ☐	Part Moved ☐				
Internal Transport ☐	Poor Information ☐	Crushing ☐	Countersink ☐	Off-set ☐	Drawing ☐				
Tribal Knowledge ☐	Rushing ☐	Heat Treat ☐	Cut Too Short ☐	Mislabeled ☐	Finish ☐				
LOA ☐	Product Improvement ☐	Wave/Twist in Tube ☐	Instructions Incomplete/Unclear ☐	Fit/Function ☐	Misread ☐				
Substation ☐	Process Improvement ☐	Marks/Chatter ☐	Drill Holes ☐	Misaligned/off center ☐	Turning Sequence ☐				
Past Expiry Date ☐	Manufacturing Process ☐	OTHER :							
Misidentified ☐	Past Due ☐								

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July 29, 2015 7:44:24 AM

Item ID: D412-664-209

Accept

N900040100

Setup Start ***NS1***

Revision ID:

Item Name: Aft Crosstube - Low Standard

Stop ***NS2***

Start Date: 7/29/2015 Start Qty: 1.00

1

Cust Item ID:

Required Date: 8/12/2015 Req'd Qty: 1.00

1

Customer:

Reference:

Approvals: Process Plan: _____ Date: _____ Tooling: _____ Date: _____
QC: _____ Date: _____ SPC (Y/N): _____ Date: _____

Run Start ***NR1***
Stop ***NR2***

Sequence ID/ Work Center ID	Operation Description	Set Up/ Run Hours	Tool ID	Tool #	Plan Code	Accept Qty	Reject Qty	Reject Number	Insp. Stamp
190	Packaging	0.00							
190									
Packaging	Memo	0.00							
Packaging	*** WEAR LATEX GLOVES WHEN HANDLING CROSSTUBE***								
	Ensure copy of NDT results attached to work order.								
200	QC5- Inspect part completeness to step on W/O	0.00							
200									
QC	Memo	0.00							
Quality Control	*** WEAR LATEX GLOVES WHEN HANDLING CROSSTUBE***								
	Inspect for damage & ensure results are as per Dwg D412-664-209								
204		0.00							
204									
HandFXtube	Memo	0.00							
Hand Finishing Crosstubes	*** WEAR LATEX GLOVES WHEN HANDLING CROSSTUBE***								
	1- PRESSURE WASH AND THEN USE WASH'N WIPE TO CLEAN CROSSTUBE BEFORE CHEMICAL CONVERSION								

1X 2015-08-05

DAS
38
9-89

AUG 05 2015

DAS
41
9-89
15-9-5

DQA: _____ Date: _____



WORK ORDER NON-CONFORMANCE / UPDATE

QA Closed: _____ Date: _____

Work Order update only ☐

Work Order: _____ Part No. _____ NCR No. _____		DISPOSITION Rework ☐ Scrap ☐ Use-as-is ☐ Suspected Unapproved ☐		AGAINST DEPARTMENT/PROCESS Skid-tube ☐ Machining ☐ Thermoforming ☐ Large Fab ☐ Cross tube ☐ Small Fab ☐ Finishing ☐ Composite ☐ Water Jet ☐ Prod. Eng. Coord. ☐ Rec/Store/Packaging ☐ Supplier ☐ Engineering ☐ Quality ☐ Other ☐					
Date :		Step #:		QTY Effective :			MRB (QSI042) Approval		
Description Work Order Deviation				Disposition				Completed By	
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Root Cause		FAULT CATEGORY							
Environment ☐	No Re-verification ☐	Pressure/Forced ☐	Temperature/Cure ☐	Power Loss/Surge ☐	Positioned Wrong ☐				
Design ☐	Operator ☐	Bending ☐	Set-up ☐	Folio/Program ☐	Outside Dimensions ☐				
Doc/Data ☐	Offset/Setup ☐	Centre Not Concentric ☐	BOM/Route ☐	Grain ☐	Over/Under tolerance ☐				
Equip/Tooling ☐	Supplier ☐	Cracks ☐	Broken/Damage/Defect ☐	Weld ☐	Part Incorrect ☐				
Handling/Pre ☐	Training ☐	Crimp/Kink/Ripple/Wave ☐	Inspection Incomplete/Unqualified ☐	Wrong Stock Pulled ☐	Part Lost/Missing ☐				
Material ☐	Use for Testing ☐	Cuffs ☐	Contamination ☐	Out of Sequence ☐	Part Moved ☐				
Internal Transport ☐	Poor Information ☐	Crushing ☐	Countersink ☐	Off-set ☐	Drawing ☐				
Tribal Knowledge ☐	Rushing ☐	Heat Treat ☐	Cut Too Short ☐	Mislabeled ☐	Finish ☐				
LOA ☐	Product Improvement ☐	Wave/Twist in Tube ☐	Instructions Incomplete/Unclear ☐	Fit/Function ☐	Misread ☐				
Substation ☐	Process Improvement ☐	Marks/Chatter ☐	Drill Holes ☐	Misaligned/off center ☐	Turning Sequence ☐				
Past Expiry Date ☐	Manufacturing Process ☐	OTHER : _____							
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Date :		Step #:		QTY Effective :			MRB (QS1042) Approval Completed By Lead hand / Supervisor Approval Verification QC / QA Coordinator Approval		
Description Work Order Deviation				Disposition					
Root Cause		FAULT CATEGORY							
Environment ☐	No Re-verification ☐	Pressure/Forced ☐	Temperature/Cure ☐	Power Loss/Surge ☐	Positioned Wrong ☐				
Design ☐	Operator ☐	Bending ☐	Set-up ☐	Folio/Program ☐	Outside Dimensions ☐				
Doc/Data ☐	Offset/Setup ☐	Centre Not Concentric ☐	BOM/Route ☐	Grain ☐	Over/Under tolerance ☐				
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Handling/Pre ☐	Training ☐	Crimp/Kink/Ripple/Wave ☐	Inspection Incomplete/Unqualified ☐	Wrong Stock Pulled ☐	Part Lost/Missing ☐				
Material ☐	Use for Testing ☐	Cuffs ☐	Contamination ☐	Out of Sequence ☐	Part Moved ☐				
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Root Cause Environment ☐ Design ☐ Doc/Data ☐ Equip/Tooling ☐ Handling/Pre ☐ Material ☐ Internal Transport ☐ Tribal Knowledge ☐ LOA ☐ Substation ☐ Past Expiry Date ☐ Misidentified ☐ No Re-verification ☐ Operator ☐ Offset/Setup ☐ Supplier ☐ Training ☐ Use for Testing ☐ Poor Information ☐ Rushing ☐ Product Improvement ☐ Process Improvement ☐ Manufacturing Process ☐ Past Due ☐		FAULT CATEGORY Pressure/Forced ☐ Bending ☐ Centre Not Concentric ☐ Cracks ☐ Crimp/Kink/Ripple/Wave ☐ Cuffs ☐ Crushing ☐ Heat Treat ☐ Wave/Twist in Tube ☐ Marks/Chatter ☐ Temperature/Cure ☐ Set-up ☐ BOM/Route ☐ Broken/Damage/Defect ☐ Inspection Incomplete/Unqualified ☐ Contamination ☐ Countersink ☐ Cut Too Short ☐ Instructions Incomplete/Unclear ☐ Drill Holes ☐ Power Loss/Surge ☐ Folio/Program ☐ Grain ☐ Weld ☐ Wrong Stock Pulled ☐ Out of Sequence ☐ Off-set ☐ Mislabeled ☐ Fit/Function ☐ Misaligned/off center ☐ Positioned Wrong ☐ Outside Dimensions ☐ Over/Under tolerance ☐ Part Incorrect ☐ Part Lost/Missing ☐ Part Moved ☐ Drawing ☐ Finish ☐ Misread ☐ Turning Sequence ☐			
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Item ID: D412-664-209

Accept

N900040100Setup Start ***NS1***

Revision ID:

Stop ***NS2***

Item Name: Aft Crosstube - Low Standard

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Stop ***NR2***

Sequence ID/ Work Center ID	Operation Description	Set Up/ Run Hours	Tool ID	Tool #	Plan Code	Accept Qty	Reject Qty	Reject Number	Insp. Stamp
--------------------------------	--------------------------	----------------------	---------	--------	--------------	---------------	---------------	------------------	----------------

240

0.00

240

Crosstubes

Crosstubes

Memo

0.00

15-8-7

1- Install center support using scoth-weld DP460 per QSI 015, as per DWG. note 15. Install supports clamps using as per Dwg D412-644-249. Install clamp with rubber cushion as per DWG. note 16. ***ENSURE CLAMPS ARE ON TOP OF CROSSTUBE SUPPORT*** Torque clamps on support to 80-100 IN-LBS AS PER DWG.

A/R scoth-weld DP460 BATCH #: 132895
EXP DATE: 8/16

2- **IF NOT ALREADY PRESENT ON CHAFFING SHEILD.** Apply a thin coat of proseal 890 per QSI 015 on inside concave surface of chafing shield and let cure per manufacturer's instructions. Install prosealed chafing shield onto crosstube by applying a thin coat of proseal 890 onto crosstube. Be sure to eliminate any air gaps. Install and torque clamps on chafing shield to 40-50 IN-LBS AS PER DWG.

A/R Proseal 890 Batch: 132226
EXP DATE: 12/15

AFTER FINISH CURE TIME 24H

START CURE TIME: 15-8-7FINISH CURE TIME: 15-8-8

PRIOR TO PACKAGING RE-CHECK TORQUE ON CLAMPS AFTER CURED FOR 24H.

4-Install nut plates as per Dwg D412-664-249 Touch-up rivet heads with Imron paint.

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OTHER : ☐					

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Accept

N900040100

Setup Start

NS1

Revision ID:

Stop

NS2

Item Name: Aft Crosstube - Low Standard

Start Date: 7/29/2015 Start Qty: 1.00

1

Cust Item ID:

Required Date: 8/12/2015 Req'd Qty: 1.00

1

Customer:

Reference:

Approvals:

Process Plan: _____

Date: _____

Tooling: _____

Date: _____

Run Start

NR1

QC: _____

Date: _____

SPC (Y/N): _____

Date: _____

Stop

NR2

Sequence ID/ Work Center ID	Operation Description	Set Up/ Run Hours	Tool ID	Tool #	Plan Code	Accept Qty	Reject Qty	Reject Number	Insp. Stamp
--------------------------------	--------------------------	----------------------	---------	--------	--------------	---------------	---------------	------------------	----------------

250

QC5- Inspect part completeness to step on W/O

0.00

250

QC

Memo

0.00

Quality Control

***RE-CHECK TORCQUE ON CLAMP AFTER PROSEAL HAS CURED
FOR 24 HOURS AS PER DWG.***DAS
38
9-89

AUG 10 2015

255

Pick Kit

0.00

255

Packaging

Memo

0.00

Packaging

DAS
26
9-89

1508-0

260

QC4- 100% Inspect kits for completeness

0.00

260

QC

Memo

0.00

Quality Control

DAS
02
9-89

AUG 10 2015

DQA: _____ Date: _____



WORK ORDER NON-CONFORMANCE / UPDATE

QA Closed: _____ Date: _____

Work Order update only ☐

Work Order: _____ Part No. _____ NCR No. _____		DISPOSITION Rework ☐ Scrap ☐ Use-as-is ☐ Suspected Unapproved ☐		AGAINST DEPARTMENT/PROCESS Skid-tube ☐ Machining ☐ Thermoforming ☐ Large Fab ☐ Cross tube ☐ Small Fab ☐ Finishing ☐ Composite ☐ Water Jet ☐ Prod. Eng. Coord. ☐ Rec/Store/Packaging ☐ Supplier ☐ Engineering ☐ Quality ☐ Other ☐					
Date :		Step #:		QTY Effective :			MRB (QSI042) Approval		
Description Work Order Deviation				Disposition				Completed By	
								Lead hand / Supervisor Approval Verification	
								QC / QA Coordinator Approval	
Root Cause		FAULT CATEGORY							
Environment ☐ Design ☐ Doc/Data ☐ Equip/Tooling ☐ Handling/Pre ☐ Material ☐ Internal Transport ☐ Tribal Knowledge ☐ LOA ☐ Substation ☐ Past Expiry Date ☐ Misidentified ☐	No Re-verification ☐ Operator ☐ Offset/Setup ☐ Supplier ☐ Training ☐ Use for Testing ☐ Poor Information ☐ Rushing ☐ Product Improvement ☐ Process Improvement ☐ Manufacturing Process ☐ Past Due ☐	Pressure/Forced ☐ Bending ☐ Centre Not Concentric ☐ Cracks ☐ Crimp/Kink/Ripple/Wave ☐ Cuffs ☐ Crushing ☐ Heat Treat ☐ Wave/Twist in Tube ☐ Marks/Chatter ☐	Temperature/Cure ☐ Set-up ☐ BOM/Route ☐ Broken/Damage/Defect ☐ Inspection Incomplete/Unqualified ☐ Contamination ☐ Countersink ☐ Cut Too Short ☐ Instructions Incomplete/Unclear ☐ Drill Holes ☐	Power Loss/Surge ☐ Folio/Program ☐ Grain ☐ Weld ☐ Wrong Stock Pulled ☐ Out of Sequence ☐ Off-set ☐ Misabeled ☐ Fit/Function ☐ Misaligned/off center ☐	Positioned Wrong ☐ Outside Dimensions ☐ Over/Under tolerance ☐ Part Incorrect ☐ Part Lost/Missing ☐ Part Moved ☐ Drawing ☐ Finish ☐ Misread ☐ Turning Sequence ☐	OTHER : ☐			

Work Order ID 135091

July 29, 2015 7:44:24 AM

135091

Page 9

Item ID: D412-664-209

Accept

N900040100

Setup Start

NS1

Revision ID:

Stop

NS2

Item Name: Aft Crosstube - Low Standard

Start Date: 7/29/2015 Start Qty: 1.00

1

Cust Item ID:

Required Date: 8/12/2015 Req'd Qty: 1.00

1

Customer:

Reference:

Approvals:

Process Plan: _____

Date: _____

Tooling: _____

Date: _____

Run Start

NR1

QC: _____

Date: _____

SPC (Y/N): _____

Date: _____

Stop

NR2

Sequence ID/ Work Center ID	Operation Description	Set Up/ Run Hours	Tool ID	Tool #	Plan Code	Accept Qty	Reject Qty	Reject Number	Insp. Stamp
--------------------------------	--------------------------	----------------------	---------	--------	--------------	---------------	---------------	------------------	----------------

270

0.00

270

Packaging

Packaging

Memo

0.00

Packaging

Identify and pack for shipping as per PPP D412-664-209

FG 98

DAS
02
9-89

AUG 10 2015

280

QC21- Final Inspection - Work Order Release

0.00

280

QC

Memo

0.00

Quality Control

MLJ

AUG 11 2015

MLJ

AUG 11 2015

DQA: _____ Date: _____



WORK ORDER NON-CONFORMANCE / UPDATE

QA Closed: _____ Date: _____

Work Order update only ☐

Work Order: _____ Part No. _____ NCR No. _____		DISPOSITION Rework ☐ Scrap ☐ Use-as-is ☐ Suspected Unapproved ☐		AGAINST DEPARTMENT/PROCESS Skid-tube ☐ Machining ☐ Thermoforming ☐ Large Fab ☐ Cross tube ☐ Small Fab ☐ Finishing ☐ Composite ☐ Water Jet ☐ Prod. Eng. Coord. ☐ Rec/Store/Packaging ☐ Supplier ☐ Engineering ☐ Quality ☐ Other ☐					
Date :		Step #:		QTY Effective :			MRB (QSI042) Approval		
Description Work Order Deviation				Disposition				Completed By	
								Lead hand / Supervisor Approval Verification	
								QC / QA Coordinator Approval	
Root Cause		FAULT CATEGORY							
Environment ☐	No Re-verification ☐	Pressure/Forced ☐	Temperature/Cure ☐	Power Loss/Surge ☐	Positioned Wrong ☐				
Design ☐	Operator ☐	Bending ☐	Set-up ☐	Folio/Program ☐	Outside Dimensions ☐				
Doc/Data ☐	Offset/Setup ☐	Centre Not Concentric ☐	BOM/Route ☐	Grain ☐	Over/Under tolerance ☐				
Equip/Tooling ☐	Supplier ☐	Cracks ☐	Broken/Damage/Defect ☐	Weld ☐	Part Incorrect ☐				
Handling/Pre ☐	Training ☐	Crimp/Kink/Ripple/Wave ☐	Inspection Incomplete/Unqualified ☐	Wrong Stock Pulled ☐	Part Lost/Missing ☐				
Material ☐	Use for Testing ☐	Cuffs ☐	Contamination ☐	Out of Sequence ☐	Part Moved ☐				
Internal Transport ☐	Poor Information ☐	Crushing ☐	Countersink ☐	Off-set ☐	Drawing ☐				
Tribal Knowledge ☐	Rushing ☐	Heat Treat ☐	Cut Too Short ☐	Mislabeled ☐	Finish ☐				
LOA ☐	Product Improvement ☐	Wave/Twist in Tube ☐	Instructions Incomplete/Unclear ☐	Fit/Function ☐	Misread ☐				
Substation ☐	Process Improvement ☐	Marks/Chatter ☐	Drill Holes ☐	Misaligned/off center ☐	Turning Sequence ☐				
Past Expiry Date ☐	Manufacturing Process ☐	OTHER : _____							
Misidentified ☐	Past Due ☐								

Picklist Print

July 29, 2015 7:46:35 AM

Page 1

Work Order ID: 135091

135091

Parent Item: D412-664-209

D412-664-209

Parent Item Name: Aft Crosstube - Low Standard

Start Date: 7/29/2015

Required Date: 8/12/2015

Start Qty: 1.00

Required Qty: 1.00

Comments:

IPP Rev:A New Issue 07.09.12 EC verified by: JLM
 IPP Rev:B ECN 1100 08-01-11 DD verified by EC
 IPP Rev:C ECN 1121 08-02-25 DD verified by:EC
 IPP Rev:D 08-06-12 add comment in seq. 24 DD verified
 by:EC
 11.10.03 DEO D412-664-249-B-2 DD verf:EC

IPP REV:E

Component Item ID/ Item Name	Replacement Item ID	Mfg/ Purch	Bin Item	Primary Location	Last Location	Route Seq ID	Unit of Measure	Qty on Hand	Qty per Kit	Total Qty	Qty Issued	Date Issued	Status
---------------------------------	------------------------	---------------	-------------	---------------------	------------------	-----------------	--------------------	----------------	-------------	--------------	---------------	----------------	--------

NAS1149D0663J

Purchased

No

100

Each

1,367.000

18

18

NAS1149D0663.J

Washer

**DAS
02
9-89**

Location

Loc Qty

Loc Code

ST260

300

M131618

300

ST260a

1000

M132256

1000

ST269

67

M126334

67

D412-664-209TRN

Manufactured

No

140

Each

0.0000

1

D412-664-209TRN

Crosstube Turning Detail

B132291

D3660-1

Manufactured

No

220

Each

12.0000

2

D3660-1

Cuff

Location

Loc Qty

Loc Code

ST509

12

113140

3

121057

2

130601

2

133147

4

95844

1

**DAS
28
9-89**

ISA

①

JW 15.07.29

②

BL 15/08/04

Picklist Print

July 29, 2015 7:46:35 AM

Page 2

Work Order ID: 135091

135091

Parent Item: D412-664-209

D412-664-209

Parent Item Name: Aft Crosstube - Low Standard

Start Date: 7/29/2015

Required Date: 8/12/2015

Start Qty: 1.00

Required Qty: 1.00

CR3212-4-07

Purchased

No

240

Each

475.0000

44

44

CR3212-4-07

CHERRY RIVET

DAS

41

9-89

15-8-5

Location

Loc Qty

Loc Code

ST320

475

m131800

6

m132249

469

45 -> 1 Scrap

D2896-1

Manufactured

No

240

Each

11.0000

1

1

D2896-1

Support

DAS

41

9-89

15-8-7

Location

Loc Qty

Loc Code

LG052

2

115385

2

LG053

9

129585

9

D3189-1

Manufactured

No

240

Each

19.0000

2

2

D3189-1

Chaffing Shield

DAS

41

9-89

15-8-7

Location

Loc Qty

Loc Code

FG

2

36065

2

LG053

17

134617

17

2

Picklist Print

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Page 3

Work Order ID: 135091

Parent Item: D412-664-209

Parent Item Name: Aft Crosstube - Low Standard

135091

D412-664-209

Start Date: 7/29/2015

Required Date: 8/12/2015

Start Qty: 1.00

Required Qty: 1.00

D3595-063-570

Manufactured No

240 Each

86.0000

2 2

DAS

D3595-063-570

41

9-89

15-8-7

Rubber Cushion 0.63" wide x 5.70" Long

Location

Loc Qty

Loc Code

FG	12	
42243	12	
LG051	74	
115707	28	2
116260	46	

MS21920-28

Purchased No

240 Each

157.0000

4 4

DAS

MS21920-28

41

9-89

15-8-7

Clamp

Location

Loc Qty

Loc Code

FG	1	
105884	1	
LG050	60	
131651	8	
M130400	50	
M130665	2	
LG051	96	
M132169	38	
M132381	20	4
M132522	38	

MS21920-30

Purchased No

240 Each

48.0000

2 2

DAS

MS21920-30

41

9-89

15-8-7

Clamp

Location

Loc Qty

Loc Code

LG	25	
m131689	25	
LG050	23	
m128827	23	2

July 29, 2015 7:46:35 AM

Shop Packet Print

Page 3

Picklist Print

July 29, 2015 7:46:35 AM

Page 4

Work Order ID: 135091

Parent Item: D412-664-209

Parent Item Name: Aft Crosstube - Low Standard

135091

D412-664-209

Start Date: 7/29/2015

Required Date: 8/12/2015

Start Qty: 1.00

Required Qty: 1.00

AN6-40A

Purchased

No

260

Each

144.0000

4

4

AN6-40A

3/8-24 BOLT X 3" LONG

DAS
02
9-89

Location

Loc Qty

Loc Code

ST286A

144

M131618

44

M131803

100

AN6-41A

Purchased

No

260

Each

85.0000

2

2

AN6-41A

Bolt

DAS
02
9-89

Location

Loc Qty

Loc Code

ST286A

65

M129913

5

M131957

60

ST333

20

M131618

20

MS21042L6

Purchased

No

260

Each

293.0000

6

6

MS21042L6

Nut

DAS
02
9-89

Location

Loc Qty

Loc Code

ST260a

75

m132262

75

ST273A

200

m131624

200

ST305

1

m129909

1

t260a

17

m131317

17

AUG 07 2015

DAS
26
9-89

July 29, 2015 7:46:36 AM

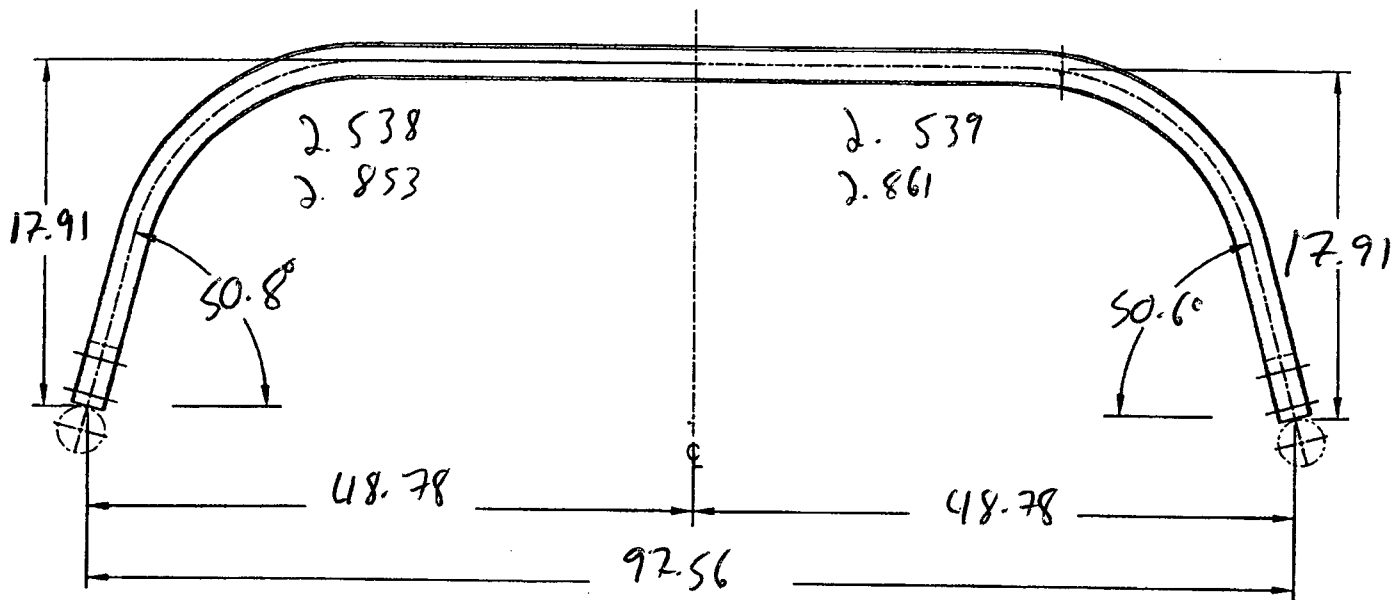
Shop Packet Print

Page 4

20150729

OSPACE LTD	Work Order:	135091
Crosstube Low Aft (412)	Part Number:	D412-664-209
on Dwg: D412-664-249 Rev: C		Page 1 of 1

Required Dimension	Min	Max
Height	17.78	18.04
1/2 Span	48.55	48.81
Angle	49	52
Total Span	97.1	97.62
Bending Passes	8	--
Crushing	--	6% / 10%



	Side A	Side B
Bending Passes	14	14
Crushing	5.8%	6.0%
Comments		

QC15 Inspection	38
Date	15-08-04

Rev	Date	Change	Revised by	Approved
A	08.02.29	New Issue	KJ/JM	
B	12.04.16	Added bending, crushing dimensions	KJ	
C	15.04.14	Dwg Rev updated	KJ	

Item	Qty -249	Part Number	Description
1	X	D412-664-249	CROSSTUBE ASSEMBLY (412 LOW AFT)
2	1	D6009-129	CROSSTUBE
3	1	D2896-1	SUPPORT
4	2	D3189-1	CHAFING SHIELD
5	2	D3595-063-570	RUBBER CUSHION
6	2	D3660-1	CUFF
7	44	CR3212-4-07	RIVET (OR M7895/3-4-07)
8	4	MS21920-28	CLAMP
9	2	MS21920-30	CLAMP (OR MS21920-32)
10	A/R	SCOTCH-WELD DP460	EPOXY ADHESIVE, 3M SCOTCH-WELD
11	A/R	PROSEAL 890	SEALANT, MIL-S-8802 CLASS B2
12	A/R	SIKAFLEX-241/-291	SEALANT (OR PROSEAL 890 OR MIL-S-8802 CLASS B2 SEALANT)

GENERAL NOTES:

- 1) MATERIAL: MANUFACTURED FROM D6009-129
FINISHED LENGTH = 127.826±0.020 (BEFORE BENDING/TRIMMING)
- 2) FINISH: CHEMICAL CONVERSION COAT PER DART QSI 005 4.1
PRIME INSIDE AND OUTSIDE PER DART QSI 005 4.2
PAINT OUTSIDE PER DART QSI 005 4.2
- 3) TOLERANCES ARE PER DART QSI 018 UNLESS OTHERWISE NOTED.
- 4) UNITS: INCHES UNLESS OTHERWISE NOTED.
- 5) BREAK SHARP EDGES: 0.005 TO 0.010 MAX.
- 6) IDENTIFICATION: SCRIBE DART PART NUMBER 'D412-664-249' AND BATCH NUMBER ON INSIDE OF CUFF USING VIBRATING STYLUS.
- 7) WEIGHT: 42.5 lbs
- 8) PART IS SYMMETRIC ABOUT CENTERLINE.
- 9) EXTREME CARE MUST BE TAKEN TO PROTECT THE OUTSIDE SURFACE OF THE TUBE. THE OUTSIDE SURFACE MUST BE SMOOTH AND FREE FROM SURFACE DEFECTS SUCH AS SCRATCHES, NICKS, OR DENTS. DEFECTS UP TO 0.005" MAY BE BLENDED OUT LONGITUDINALLY. CIRCUMFERENTIAL GRIND MARKS ARE UNACCEPTABLE.

TURNING

- 10) WHEN MACHINING TAPER, RUN CUTTER OFF PART. BLEND OUT EDGE LONGITUDINALLY, TRANSITION SHOULD BE SMOOTH.

BENDING

- 11) BEND PROGRESSIVELY WITH A MINIMUM OF 8 PASSES. MAXIMUM TUBE FLATTENING DUE TO BENDING IS 6% BASED ON O.D., EXCEPT UP TO 10% IS ALLOWED IN AREA NOTED.
- 12) LIQUID PENETRANT INSPECT OUTSIDE SURFACE OF CROSSTUBE PER QSI 038.

ASSEMBLY

- 13) INSTALL D3660-1 CUFF AFTER CHEMICAL CONVERSION COAT BUT BEFORE PAINT, WITH A LAYER OF SIKAFLEX-241/-291 OR PROSEAL 890 OR MIL-S-8802 CLASS B2 SEALANT BETWEEN CUFF AND CROSSTUBE. SEAL EDGE OF CUFF TO ENSURE NO GAPS.
- 14) TOUCH-UP HOLES WITH CHEMICAL CONVERSION COAT.
- 15) INSTALL D2896-1 CENTER SUPPORT USING A 0.04" TO 0.07" THICK LAYER OF SCOTCH-WELD DP460 PER QSI 015.
- 16) INSTALL MS21920-30 CLAMPS (OR -32) WITH D3595-063-570 RUBBER CUSHIONS TO SECURE THE D2896-1 SUPPORT ON TOP SIDE OF THE CROSSTUBE. ENSURE CLAMPS ARE ON TOP SIDE OF CROSSTUBE.
- 17) APPLY A THIN COAT OF PROSEAL 890 ON INSIDE CONCAVE SURFACE OF D3189-1 CHAFING SHIELD AND LET CURE PER MANUFACTURER'S INSTRUCTIONS. INSTALL PROSEALED D3189-1 CHAFING SHIELD ONTO CROSSTUBE BY APPLYING A THIN COAT OF PROSEAL 890 ONTO CROSSTUBE. BE SURE TO ELIMINATE ANY AIR GAPS.
- 18) TORQUE CLAMPS ON D2896-1 SUPPORT 80 TO 100 IN-LB. TORQUE CLAMPS ON D3189-1 CHAFING SHIELD 40 TO 50 IN-LB. ENSURE AT LEAST 1.5 THREADS SHOWING IN SAFETY AND THAT NUT HAS NOT BOTTOMED-OUT AFTER TORQUING. PRIOR TO PACKAGING, RE-CHECK TORQUE ON CLAMPS AFTER ADHESIVES HAVE CURED FOR 24 HOURS.

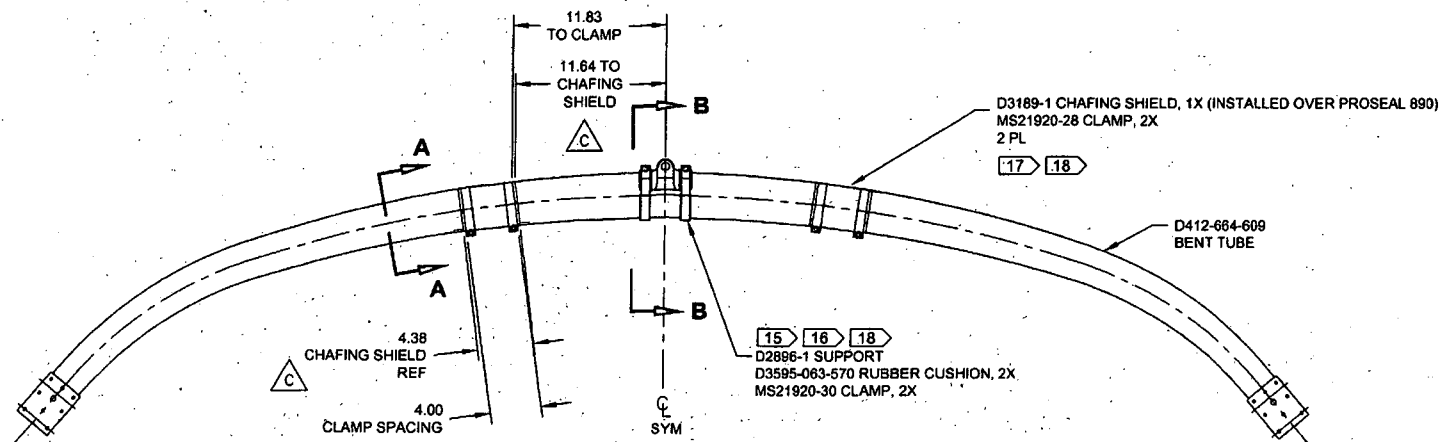
RELEASED
2014-05-26

135091

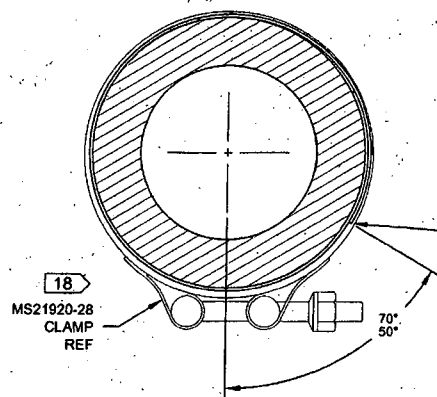
20150729

C	NOTES RE-ORDERED, SCOTCH-WELD WAS MAGNOBOND (C8-1), ADD CLAMP RETORQUE (A8-1). REMOVE ABRASION STRIP, CHAFING SHIELD NOW 4.38 WIDE (C8-2), CLAMPS FLIPPED TO PREVENT CHAFING (B7-2), INCORP. DEO B-1/2-3	CP	14.04.01
B	REVISE GENERAL NOTES; UPDATE TO CURRENT STANDARDS	RF	09.09.30
A	NEW ISSUE	CP	07.07.07
REV.	DESCRIPTION	BY	DATE
DESIGN			
DRAWN			
CHECKED			
MFG. APPR.			
APPROVED			
DE APPR.			
DATE	14.04.01		

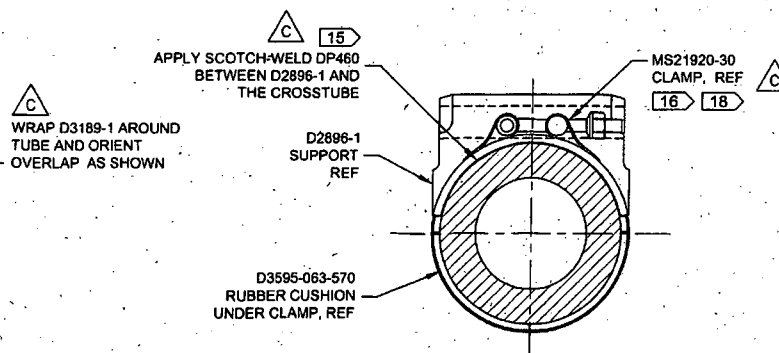
DART AEROSPACE LTD HAWKESBURY, ONTARIO, CANADA	
DRAWING NO. D412-664-249	REV. C SHEET 1 OF 4
TITLE CROSSTUBE (412 LOW AFT)	SCALE NTS
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D412-664-249
ASSEMBLY DETAIL



SECTION A-A
SCALE 6X

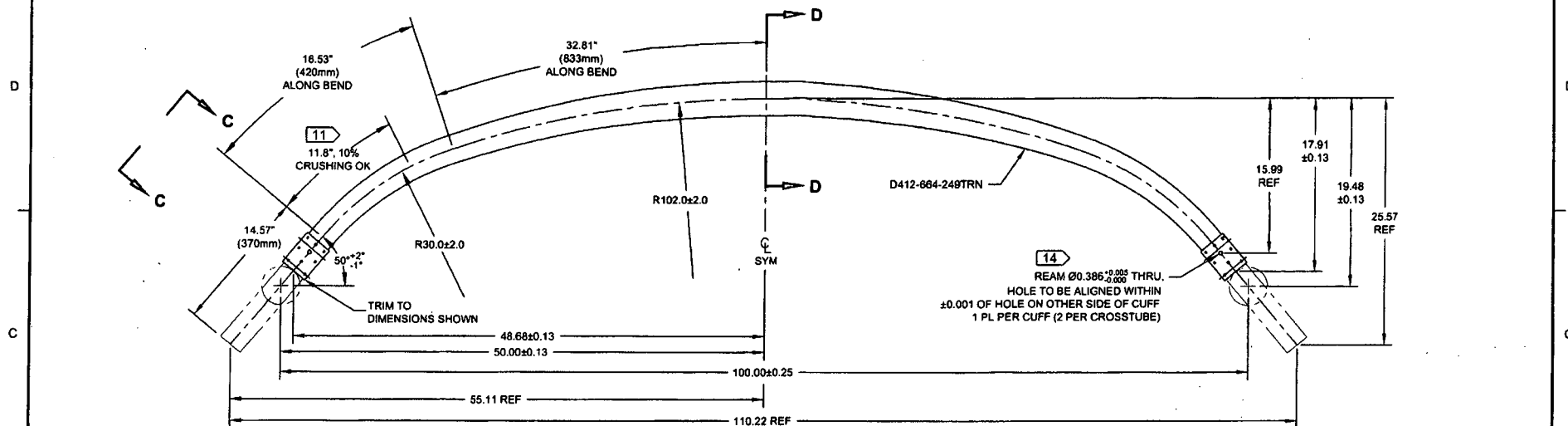


SECTION B-B
SCALE 4X

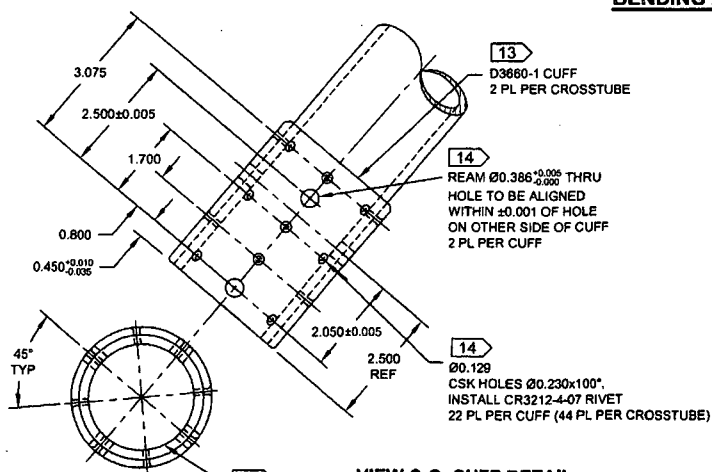
RELEASE
2014-05-26

DESIGN		DART AEROSPACE LTD
DRAWN		HAWKESBURY, ONTARIO, CANADA
CHECKED		DRAWING NO. REV. C
MFG. APPR.		D412-664-249 SHEET 2 OF 4
APPROVED		TITLE SCALE
DE APPR.		CROSSTUBE (412 LOW AFT) NTS
DATE	14.04.01	COPYRIGHT © 2007 BY DART AEROSPACE LTD
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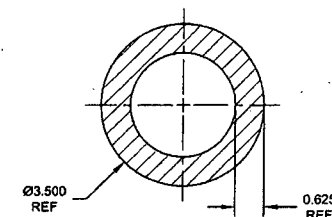
8 7 6 5 4 3 2 1



D412-664-609
BENDING AND DRILLING DETAIL 11



VIEW C-C: CUFF DETAIL
SCALE 4X

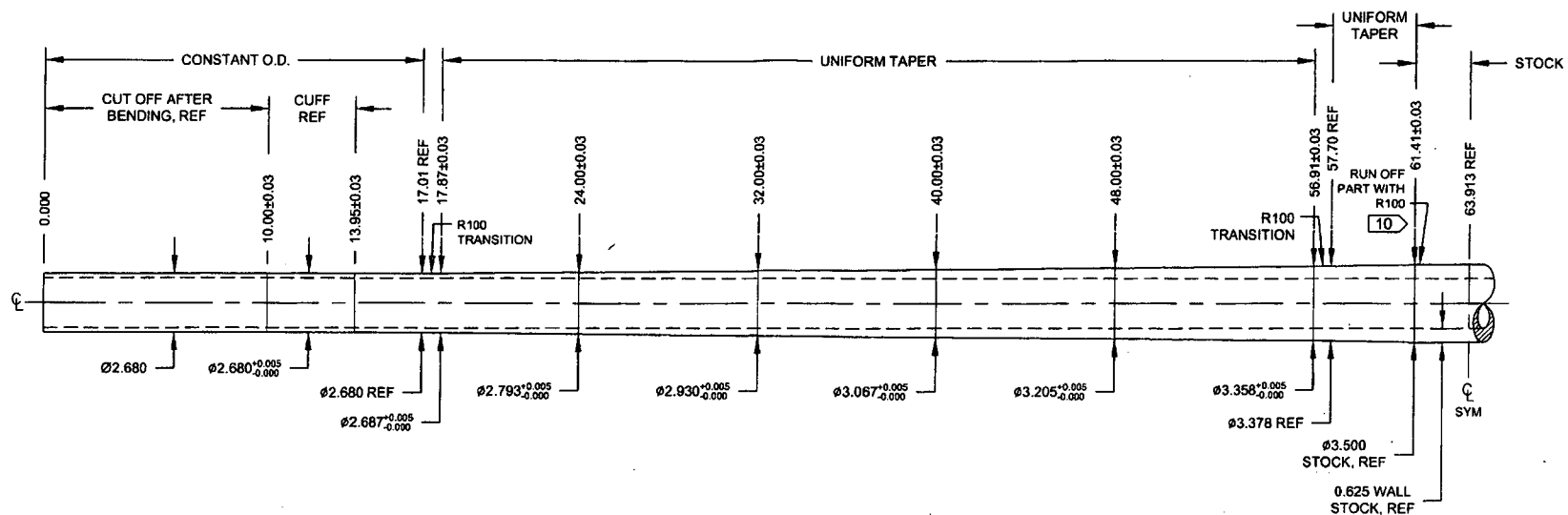


SECTION D-D
SCALE 4X

RELEASED
2014-05-26
JW

DESIGN	9	DART AEROSPACE LTD	
DRAWN	9	HAWKESBURY, ONTARIO, CANADA	
CHECKED	JW	DRAWING NO.	REV. C
MFG. APPR.		D412-664-249	SHEET 3 OF 4
APPROVED		TITLE	SCALE
DE APPR.		CROSSTUBE (412 LOW AFT)	NTS
DATE	14.04.01	COPYRIGHT © 2007 BY DART AEROSPACE LTD THIS DOCUMENT IS PRIVATE AND CONFIDENTIAL AND IS SUPPLIED ON THE EXPRESS CONDITION THAT IT IS NOT TO BE USED FOR ANY PURPOSE OR COPIED OR COMMUNICATED TO ANY OTHER PERSON WITHOUT WRITTEN PERMISSION FROM DART AEROSPACE LTD.	

8 7 6 5 4 3 2 1



D412-664-249TRN
TURNING DETAIL

RELEASED
 2014-05-26

DESIGN	92	DART AEROSPACE LTD	
DRAWN	92	HAWKESBURY, ONTARIO, CANADA	
CHECKED	92	DRAWING NO.	REV. C
MFG. APPR.	92	D412-664-249	SHEET 4 OF 4
APPROVED	92	TITLE	SCALE
DE APPR.	92	CROSSTUBE (412 LOW AFT)	NTS
DATE	14.04.01	COPYRIGHT © 2007 BY DART AEROSPACE LTD	
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D412-664-209

edited (12-10-15)

Tangent Lines/Rollers:

3.5" rollers for middle/3.25" rollers for side bends

32.8" red...from CL

32.125" from cuff

15.250" from cuff

Middle Bend:

Large table, **Approach: 3000/3000**, 32.8 line

Run Program M4-5-6-7-8-9-10-11-12-13-14

CHECK, Re-run 14 as required., flip tube if needed. DO NOT overbend middles, the side programs are VERY effective, and will easily overbend if middles are past reference line.

BENDER CHANGE TO 3.25" ROLLERS

Side Bends: down taper

SMALL SLUG MUST BE USED FOR SIDE BENDS. Large Table, start on 32.125" line

Approach: 3735/1800 Run Prog. 412 s1 - 8 CHECK with reference lines on board (stop early if middles are overbent.)

Side Bends: up taper

Large Table... start on 15.250" line **Approach: 3732/3220**

Run 412 s-UT 1 to 4 as required checking between each program.

Re-run same prog. if within (0.200") of being done. Up taper programs are very strong. expect a large reaction.

NOTES:

12/11/8 batch 62039 had overbent middles, stopped at s6 and s4 to achieve s8 reference line on board. then ran ut1 checked, and ut2, approaches for these programs were very tight due to us stopping the downtaper programs early. one side was overbent after ut2 (48.4375" @ max height of 18.04") we were forced to bring the opposite side in to match. one side finished at ut2, the opposite side at ut4 after running ut2 and ut3 multiple times.

1	4	1
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Dart Aerospace Ltd.
1270 Aberdeen Street
Hawkesbury, ON K6A 1K7
Tel: 613 632 9577
Fax: 613 632 1053

PURCHASE ORDER

Purchase Order ID PO29379

Purchase Order Date 8/5/2015

PO Print Date 8/5/2015

Page Number 1 of 2

Order From :

VC-SKY001

Ship To : DART AEROSPACE LTD

SKYSERVICE
6120 MIDFIELD ROAD
MISSISSAUGA, ONTARIO L5P 1B1
CANADA

1270 ABERDEEN
HAWKESBURY, ON K6A 1K7
CANADA

Contact Name
Vendor Phone 905-678-5636

Ship To Contact
Ship To Phone
Ship Via: Delivered
Ship Acct:

Buyer Chantal Lavoie
Customer POID
Customer Tax # 10127-2607
Terms Net 30
Currency CAD
FOB FCA - (Free Carrier)

Line Nbr	Reference Vendor Part Number Line Comments Delivery Comments	Description/ Mfg ID	Req Date/ Taxable Promise Date	CD	Req Qty/ Unit of Measure	PO Unit Price	Extended Price
1	71401-45	PROCUREMENT QUALITY CLAUSES	8/5/2015		1.00	\$0.00	\$0.00
			No 8/5/2015				
	PROCUREMENT QUALITY CLAUSES A005 RIGHT OF ENTRY A016 PERSONNEL QUALIFICATION A020 NON - DESTRUCTIVE TEST/INSPECTION IDENTIFICATION A041 QUALITY MANAGEMENT SYSTEM A042 DART NOTIFICATION BY SUPPLIER A043 RETENTION OF QUALITY DOCUMENTS						

Line Total: \$0.00

2	135091	D412-664-209 CROSSTUBE	8/5/2015		1.00	\$300.00	\$300.00
			Yes 8/5/2015				
	LIQUID PENETRANT INSPECTION AS PER QSI 038 OR LPI AS PER ASTM 1417 LEVEL 2						

Note:

8/5/2015

88 15-08-05



skyservice Work Order Traveler

Sky Service F.B.O. Inc.

DOT APP 53-89 / EASA 145.7142 / BDA AMO 385

WO #: MWO25414	Customer: Dart Aerospace Ltd.	Dept: NDT YUL	Reference: 29379
Descr:	PN:	S/N:	Qty: 1
Make:	Model:	Reg:	A/C S/N:
TSN:	CSN:	TSO:	
Task: UNSCHEDULED			Sequence: 1

Work Required:

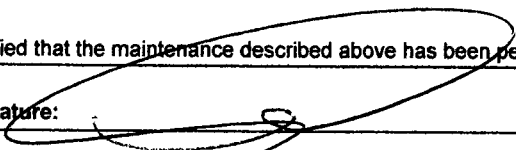
CARRY OUT NDT ON 2 AFT CROSSTUBES AS PER PO29379,

ITEM ID# D412-664-209, WORK ORDER ID# 135091, 135092

5/15-08-05

Action Taken:						Date:	Initial/Stamp:
LPI C/O IAW ASTM E-1417M-13 ***NO CRACK FOUND*** PEN. ZL-56, MPO13600, UV M-20141, CLEANER SKC-S MPO13923 , DEV. MPO11715						5/AUG 2015	 
Description	Location	P/N	Qty	Batch	S/N Off	S/N On	

I certified that the maintenance described above has been performed in accordance with the applicable standard of airworthiness.

Signature: 	ACA/SCA Stamp 	Date: 5/AUG 2015
Name: RAFIG MELIKIAN		